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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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APPLIED MATERIALS, INC.
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M/S 2061
SANTA CLARA, CA 95050

EXAMINER

CROWELL, ANNA M

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 03/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/918,683

Applicant(s)

SUN ET AL.

Examiner

Michelle Crowell

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 November 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3, 5-14, 16-26 and 28-45 is/are pending in the application.
- 4a) Of the above claim(s) 34-45 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5-14, 16-26, and 28-33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-33, drawn to an electrochemically roughened aluminum or aluminum alloy surface, classified in class 156, subclass 345.1.
 - II. Claims 34-45, drawn to a method of electrochemically roughening an aluminum or aluminum alloy surface, classified in class 204, subclass 640.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case, the process as claimed could be used to make other and materially different product, such as the surface preparation of other materials which are different from aluminum or an aluminum alloy.

3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

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4. During a telephone conversation between examiner Thomas Parson and Ms. Shirley Church on October 7, 2002 a provisional election was made without traverse to prosecute the invention of Group I, claims 1-33. Affirmation of this election must be made by applicant in replying to this Office action. Claims 34-45 have been withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 2, 3, 13, 14, 25, and 26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 2, 3, 13, 14, 25, and 26 recite a surface roughness range, however, the unit of measurement for surface roughness is unclear.

For example, Hisamoto et al. teaches that Ra is 0.3 μ m. How do you convert Ra to μ m?

Drawings

7. The proposed drawing correction is approved.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless —

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1,7, 9-12, 18, 20-22, 24, and 30 are rejected under 35 U.S.C. 102(b) as being anticipated by Satoh (U.S. 6,063,203).

With respect claims 1, 12, and 24, referring to Figure 3 and column 3, line 10 – column 4, line 35, Satoh discloses a semiconductor processing chamber 4 having at least one interior surface 1 (susceptor) comprising electrochemically roughened aluminum or aluminum alloy (col. 3, lines 14-31, col. 3, line 64 –col. 4, line 14), wherein the electrochemically roughened aluminum or aluminum alloy surface has the appearance or rolling hills and valleys, when magnified (Figure 2C).

With respect to claims 7, 18, and 30, the electrochemically roughened aluminum or aluminum alloy surface underlies a coating selected from the group consisting of an anodized coating (col.3, lines 16-18).

With respect to claims 9 and 20, the semiconductor chamber is selected from the group consisting of a deposition chamber (col. 4, lines 53-54).

With respect to claims 10 and 21, the limitation of the chamber being an etch chamber and the etching material being selected from the group consisting of a dielectric material, a metal and a polysilicon is considered intended use. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. Furthermore, inclusion of material or article worked upon by a structure being claimed does not impart patentability to the

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claims. The apparatus of Satoh is capable of being an etch chamber and etching a material selected from the group consisting of a dielectric material, a metal, and a polysilicon.

With respect claims 11 and 22, the limitation of the process chamber being an etch chamber and fluorine and carbon being used in an etch process are considered intended use. Expressions relating the apparatus to contents thereof during an intended operation are of no significance in determining patentability of the apparatus claim." The apparatus of Satoh is capable of being an etch chamber and providing fluorine and carbon in an etch process.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

12. Claims 2, 3, 5, 6, 13, 14, 16, 17, 25, 26, 28, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Satoh (U.S. 6,063,203).

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With respect to claims 2, 13, and 25, the at least one interior surface has a surface roughness ranging from about 1 μm to about 8 μm . Satoh fails to expressly disclose a surface roughness of 100 Ra to about 200 Ra. However, a prima facie case of obviousness still exists because it would have been obvious to one of ordinary skill in the art to optimize the surface roughness of the interior surface during routine experimentation to increase adhesion of materials to the interior surface.

With respect to claims 3, 14, and 26, wherein the surface roughness ranges from about 1 μm to about 8 μm . Satoh fails to expressly disclose a surface roughness of 110 Ra to about 160 Ra. However, a prima facie case of obviousness still exists because it would have been obvious to one of ordinary skill in the art to optimize the surface roughness of the interior surface during routine experimentation to increase adhesion of materials to the interior surface.

With respect to claims 5, 16, and 28, wherein the height of the hills ranges from about 8 μm to about 26 μm . In this case, where the only difference between the prior art (susceptor with hills, Fig. 2C) and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device.

With respect to claims 6, 17, and 29, wherein the distance between the center of one hill and the center of an adjacent hill ranges from about 30 μm to about 100 μm . In this case, where the only difference between the prior art (susceptor with hills, Fig. 2C) and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device.

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13. Claims 8, 19, 23, and 31-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Satoh (U.S. 6,063,203) in view of Kugo et al. (U.S. 6,007,673).

The teachings of Satoh have been discussed above.

Satoh fails to teach byproducts being generated during an etch process or a deposition process that adhere to the roughened aluminum surface and the processing component is a wall liner or a gas distribution plate.

Referring to Figures 1 and 9, column 6, line 28-column 7, line 23, and column 13, line 63-column 14, line 45, Kugo teaches a semiconductor processing chamber comprising a plate 10 (col. 6, line 60-col. 7, line 4), a gas distribution plate 30 (col. 14, lines 7-13), and an aluminum wall 1 (col. 14, lines 37-41) which are roughened. By roughening these components, the adhesion of the deposits 21 to the components is enhanced, and therefore production yields are improved. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention that byproducts being generated during an etch process or a deposition process to will adhere to the roughened aluminum surface since adhesion of by products is enhance by the roughening of the surface. Also, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the apparatus of Satoh as to roughening other processing components such as the wall liner or the gas distribution plate in order to improve production yields.

Response to Arguments

14. Applicant's arguments filed November 14, 2003 have been fully considered but they are not persuasive.

Applicant has argued that the Satoh reference requires additional surface preparation

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steps which applicants teach are harmful, and forms a surface which is different from the surface formed and claimed by applicants, and neither teaches nor suggests applicants' presently claimed invention. However, the claim does not preclude additional surface preparation steps.

Moreover, Figure 2C demonstrates an electrochemically roughened surface having the appearance of rolling hills and valleys when magnified. Additionally, as seen in Figure 2C sharp protrusions are eliminated from the chamber's surface (col. 4, lines 28-31).

Applicant has argued that Kugo et al. teaches the use of sand blasting or grinding with coarse abrasive grains to effect roughening of the surface to the desired surface roughness and teaches having sharp points not rolling hills and valleys upon magnification. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Satoh teaches an electrochemical roughened aluminum surface having rolling hills and valleys upon magnification. Kugo et al. was applied to teach byproducts being generated during an etch process or a deposition process that adhere to the roughened aluminum surface and to teach that it is well known to roughen processing components such as a wall liner or a gas distribution plate. Thus, since it is known to electrochemically roughen a processing component (Satoh), it obvious to electrochemically roughen other components such as a wall liner or a gas distribution plate to improve production yields

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Conclusion

15. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Crowell whose telephone number is (571) 272-1432. The examiner can normally be reached on M-F (8:00 - 4:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on (571) 272-1439. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AMC *arl*

February 12, 2004

[Signature]
PATENT EXAMINER
TECHNICAL CENTER 1700